

with a first pressure surface exposed to fluid pressure from said passage, said enlarged distal portion being substantially complementary to said first end of said passage, and substantially blocking said passage when said pin is in its retracted position; wherein a second end of said pin has a second pressure surface exposed to hydraulic pressure in a variable pressure fluid reservoir, variation of hydraulic pressure in said reservoir assisting in reciprocating said pin, in cooperation with fluid pressure acting on said enlarged distal portion.

REMARKS

As set forth above, the problems with the specification have been rectified. Claims 3 and 6 have been amended to appear in better form with respect to amended claim 1. New claim 11 is similar to claim 1, however, claim 11 provides the limitation that the enlarged distal portion of the pin is substantially complementary to the tapered first end of the passage. Claim 11 also provides the limitation that the pin has a pressure surface on a second end that is exposed to hydraulic pressure in a variable pressure fluid reservoir, and that variation of the hydraulic pressure in the reservoir assists in reciprocating the pin, in cooperation with the fluid pressure that acts on the enlarged distal portion of the pin. Claim 11, as well as the other claims discussed below, is believed to be in condition for allowance, which is respectfully solicited.

I Rejections Under §102

Claims 1, 2, and 5 stand rejected under §102(b) as being anticipated by Carroll. Claim 1 has been amended to include the additional limitations that the enlarged distal portion has a pressure surface exposed to pressurized fluid supplied via the passage, and has an actuator operably coupled to the pin, reciprocating the pin in cooperation with the pressurized fluid. The added limitations to claim 1 are illustrated in Figure 1, in which numeral 22 represents the enlarged distal portion, 18 is a seat, and 16 represents the fluid channel through which fluid, e.g. gas, is supplied to the mold cavity. It is thus implicit in Figure 1 that inflowing fluid will exert an opening force on pin 22, urging it toward an extended position. The action of pressurized fluid on a conical valve member, such as that shown in Figure 1, is well known in the art. A reduction in fluid pressure would result in a decrease in opening force on pin 22. Likewise, Figure 22 shows that the actuator, in this case hydraulic, cooperates with the fluid supply pressure to open and close the valve. Carroll does not teach reciprocation of a pin using a combination of the fluid pressure supplied to the mold cavity and an auxiliary actuator. Thus, Carroll does not teach all the limitations of claim 1, the rejections under §102 to claim 1 and the claims dependent thereto are overcome, and Applicant respectfully solicits reconsideration thereof.

II Rejections Under §103

Claims 1, 2, 3 and 5 stand rejected under §103 as being unpatentable over Carroll in view of Johnson et al. Claim 2 has been cancelled, however, the combination of Johnson et al. with Carroll does not teach all the limitations of amended claim 1, and the rejection is overcome. In particular, neither Johnson nor Carroll disclose a pin having an

enlarged distal portion with a pressure surface exposed to pressurized fluid and an actuator operably coupled to the pin, reciprocating the pin in cooperation with the pressurized fluid. It would not have been obvious to one of skill in the art at the time of the present invention to incorporate an auxiliary actuator into a fluid-assist injection molding apparatus having valves actuated by the fluid supply pressure. As disclosed, and pictured in Figure 1, the Applicant has provided an apparatus having a pin capable of opening and closing the mold cavity to pressurized fluid utilizing a combination of the supplied fluid acting on the enlarged distal portion of the pin with a separate actuator. Claim 1 thus sets forth limitations absent from the cited references, the assertion of obviousness is overcome, and Applicant respectfully requests reconsideration of claim 1, as amended, and dependent claims 2, 3, and 5.

Claim 4 stands rejected as being unpatentable over Carroll in view of Johnson et al as applied to claims 1, 2, 3, and 5, and further in view of Denne. Claim 6 is likewise rejected under §103 as being unpatentable over Carroll in view of Johnson et al, and further in view of Terao. In light of the amendments to claim 1, from which both claims 4 and 6 depend, the rejections are overcome, and Applicant respectfully requests reconsideration thereof. The references cited in rejecting claims 4 and 6 do not, individually or in combination, teach all the limitations of amended claim 1. Thus, the rejections to claims 4 and 6 are overcome, and Applicant respectfully requests reconsideration in light of the amendments to claim 1, from which they depend.

Claims 7-10 stand rejected as unpatentable over Carroll in view of Johnson et al and Denne. Claim 7 has been amended to include the additional limitations that the pin's enlarged distal portion is exposed to fluid pressure from the hollow conduit, and that the

electronic actuator reciprocates the pin in cooperation with the fluid supply pressure. Thus, similar to claim 1, amended claim 7 includes limitations absent from the cited references, the rejections to claims 7-10 are overcome, and reconsideration is respectfully requested.

WHEREFORE, all the submitted claims are believed to be in condition for allowance, which is respectfully solicited. If Applicant may provide any further information, or assist in the prosecution of this application in any way, the Examiner is invited to contact the undersigned at (248) 362-2800.

Respectfully submitted,

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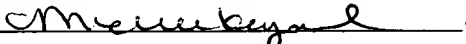
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